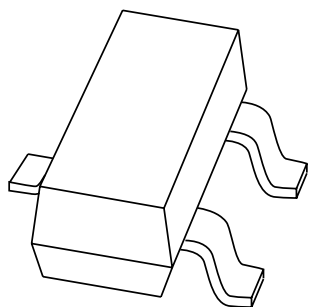


# DATA SHEET



## **BCW60 series** NPN general purpose transistors

Product specification  
Supersedes data of 1997 Mar 10

1999 Apr 22

## NPN general purpose transistors

## BCW60 series

## FEATURES

- Low current (max. 100 mA)
- Low voltage (max. 32 V).

## APPLICATIONS

- General purpose switching and amplification.

## DESCRIPTION

NPN transistor in a SOT23 plastic package.  
PNP complements: BCW61 series.

## MARKING

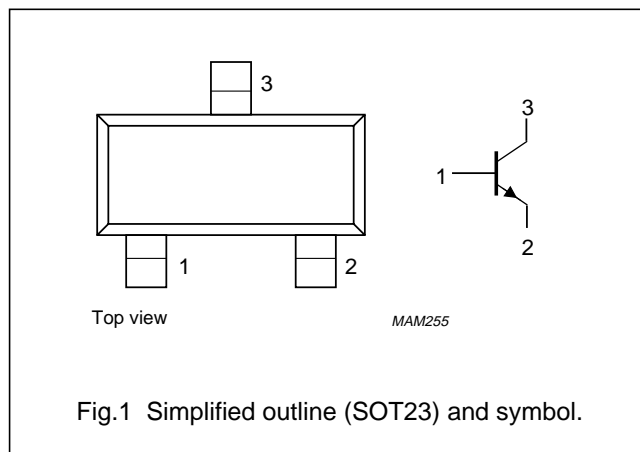
TYPE NUMBER	MARKING CODE <sup>(1)</sup>
BCW60B	AB*
BCW60C	AC*
BCW60D	AD*

## Note

1. \* = p : Made in Hong Kong.  
\* = t : Made in Malaysia.

## PINNING

PIN	DESCRIPTION
1	base
2	emitter
3	collector



## LIMITING VALUES

In accordance with the Absolute Maximum Rating System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
$V_{CBO}$	collector-base voltage	open emitter	–	32	V
$V_{CEO}$	collector-emitter voltage	open base	–	32	V
$V_{EBO}$	emitter-base voltage	open collector	–	5	V
$I_C$	collector current (DC)		–	100	mA
$I_{CM}$	peak collector current		–	200	mA
$I_{BM}$	peak base current		–	200	mA
$P_{tot}$	total power dissipation	$T_{amb} \leq 25\text{ °C}$	–	250	mW
$T_{stg}$	storage temperature		–65	+150	°C
$T_j$	junction temperature		–	150	°C
$T_{amb}$	operating ambient temperature		–65	+150	°C

## NPN general purpose transistors

## BCW60 series

## THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	VALUE	UNIT
$R_{th\ j-a}$	thermal resistance from junction to ambient	note 1	500	K/W

## Note

1. Transistor mounted on an FR4 printed-circuit board.

## CHARACTERISTICS

$T_{amb} = 25\text{ °C}$  unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$I_{CBO}$	collector cut-off current	$I_E = 0; V_{CB} = 32\text{ V}$	–	–	20	nA
		$I_E = 0; V_{CB} = 32\text{ V}; T_{amb} = 150\text{ °C}$	–	–	20	$\mu\text{A}$
$I_{EBO}$	emitter cut-off current	$I_C = 0; V_{EB} = 4\text{ V}$	–	–	20	nA
$h_{FE}$	DC current gain	$I_C = 10\text{ }\mu\text{A}; V_{CE} = 5\text{ V}$				
	BCW60B		20	–	–	
	BCW60C		40	–	–	
	BCW60D		100	–	–	
	DC current gain	$I_C = 2\text{ mA}; V_{CE} = 5\text{ V}$				
	BCW60B		180	–	310	
	BCW60C		250	–	460	
	BCW60D		380	–	630	
	DC current gain	$I_C = 50\text{ mA}; V_{CE} = 1\text{ V}$				
	BCW60B		70	–	–	
	BCW60C		90	–	–	
	BCW60D		100	–	–	
$V_{CEsat}$	collector-emitter saturation voltage	$I_C = 10\text{ mA}; I_B = 0.25\text{ mA}$	50	–	350	mV
		$I_C = 50\text{ mA}; I_B = 1.25\text{ mA}$	100	–	550	mV
$V_{BEsat}$	base-emitter saturation voltage	$I_C = 10\text{ mA}; I_B = 0.25\text{ mA}$	600	–	850	mV
		$I_C = 50\text{ mA}; I_B = 1.25\text{ mA}$	0.7	–	1.05	V
$V_{BE}$	base-emitter voltage	$I_C = 10\text{ }\mu\text{A}; V_{CE} = 5\text{ V}$	–	520	–	mV
		$I_C = 2\text{ mA}; V_{CE} = 5\text{ V}$	550	650	750	mV
		$I_C = 50\text{ mA}; V_{CE} = 1\text{ V}$	–	780	–	mV
$C_c$	collector capacitance	$I_E = I_C = 0; V_{CB} = 10\text{ V}; f = 1\text{ MHz}$	–	1.7	–	pF
$C_e$	emitter capacitance	$I_C = I_E = 0; V_{EB} = 0.5\text{ V}; f = 1\text{ MHz}$	–	11	–	pF
$f_T$	transition frequency	$I_C = 10\text{ mA}; V_{CE} = 5\text{ V}; f = 100\text{ MHz}; \text{note 1}$	100	250	–	MHz
F	noise figure	$I_C = 200\text{ }\mu\text{A}; V_{CE} = 5\text{ V}; R_S = 2\text{ k}\Omega; f = 1\text{ kHz}; B = 200\text{ Hz}$	–	2	6	dB

## Note

1. Pulse test:  $t_p \leq 300\text{ }\mu\text{s}$ ;  $\delta \leq 0.02$ .

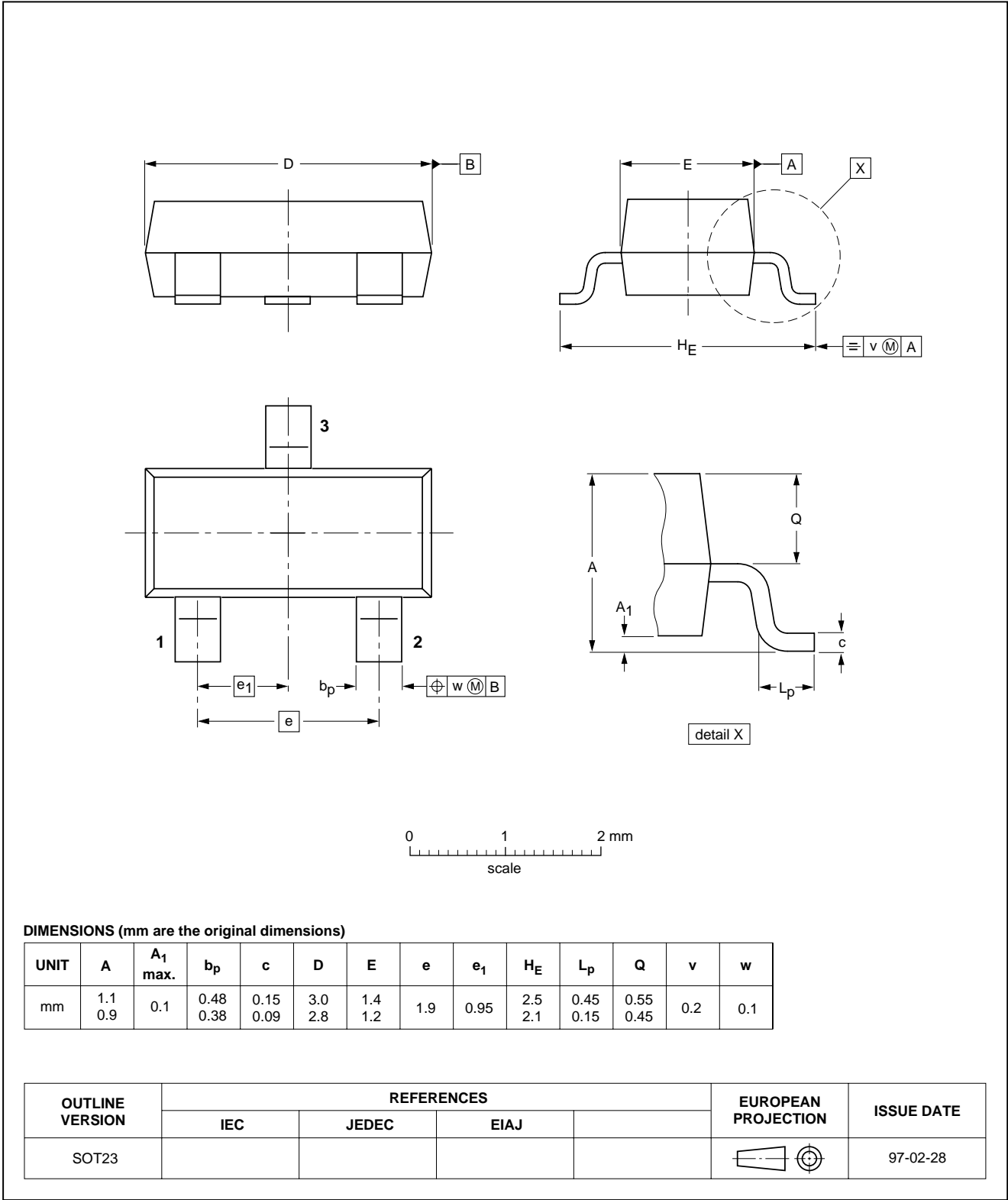
NPN general purpose transistors

BCW60 series

PACKAGE OUTLINE

Plastic surface mounted package; 3 leads

SOT23



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NPN general purpose transistors

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BCW60 series

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**DEFINITIONS**

<b>Data Sheet Status</b>	
Objective specification	This data sheet contains target or goal specifications for product development.
Preliminary specification	This data sheet contains preliminary data; supplementary data may be published later.
Product specification	This data sheet contains final product specifications.
<b>Limiting values</b>	
Limiting values given are in accordance with the Absolute Maximum Rating System (IEC 134). Stress above one or more of the limiting values may cause permanent damage to the device. These are stress ratings only and operation of the device at these or at any other conditions above those given in the Characteristics sections of the specification is not implied. Exposure to limiting values for extended periods may affect device reliability.	
<b>Application information</b>	
Where application information is given, it is advisory and does not form part of the specification.	

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NPN general purpose transistors

BCW60 series

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**NOTES**

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NPN general purpose transistors

BCW60 series

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**NOTES**

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